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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
OLSEN, KAJ K	
ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 11/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/313,184	MIWA ET AL.	
	Examiner	Art Unit	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-20,22,24,30 and 32-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *36 and 37* is/are allowed.

6)☒ Claim(s) *16-20,22,24,30,32-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 16-20, 22, 24, 30, 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (USP 5,672,811) (hereafter "Kato '811") in view of Makino et al (USP 5,676,811).

3. Kato '811 discloses a sensor element comprising negative and positive electrodes (28, 24) disposed on the same side of a solid electrolyte substrate 4c and a circuit for applying an electric potential between said negative and positive electrode. See fig. 2 and col. 12, ll. 10-33. With respect to the new limitations requiring the electrodes to be constructed of porous platinum, see col. 12, ll. 14-16 and col. 18, l. 66 through col. 22. Kato '811 also shows a profile of the electrodes that appears to show that electrodes 22 and 24 differ in size, including by at least 2:1. However, because Kato does not show how far each of these electrodes extends into their respective gas chambers (i.e. their widths in the vertical direction of fig. 1), an explicit determination that the electrodes of Kato differ in size cannot be made. However, having the electrodes of a gas sensor extend over the entire width range of a given chamber was known in the art. In particular, Makino demonstrates this. See, as an example, fig. 2 where pump electrode 8 and reference electrode 13 are shown to extend over the entire width of their respective chambers. There are a number of reasons one possessing ordinary skill in the art would have been motivated to do so. One, making the electrodes extends provides the maximum

surface area for the electrode, thereby reducing any effective resistance, increasing the magnitude of the diffusion control. In addition, large electrodes (i.e. electrodes that extend the entire width of their chambers) also allow more sample to be analyzed per unit time. In addition, electrodes that span the entire chamber width would prevent any localization of NOx concentration. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Makino for the sensor of Kato '811 in order to utilize any of the set forth advantages given above.

4. With respect to claim 17 (those limitations not covered above), the set forth element resistances would have been inherent because the sizes shown by the combined teachings of Kato '811 and Makino.

5. With respect to claims 18-20 (those limitations not covered above), the particular voltages applied or their polarities is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, see Kato '811, col. 13, l. 65 through 14, l. 5 or col. 24, ll. 41 and 42 for examples of the use of either voltage range and Kato '811 does show a negatively polarized electrode 28 with a 2:1 area ratio in comparison with electrode 24.

6. With respect to claim 22, see Kato '811 col. 11, ll. 16-20.

7. With respect to claim 24, a flat-limit current sensor is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, Kato '811 is flat and teaches the monitoring of a limiting current (col. 12, ll. 54-61.

8. With respect to claim 30 (those limitations not covered above), elements 12, 14 or 44 would read on the defined gas diffusion limiting means. In addition, current between electrodes 28 and 24 is a measure of the amount of NOx in the atmosphere. See fig. 10 as an example.

9. With respect to claim 32 (those limitations not covered above), Kato '811 comprises first and second chambers (12 and 14 respectively) formed between first and second ion conductive cell substrates (4a and 4c respectively) where first and second electrodes (28 and 24 respectively) are on the same plane as substrate 4c with electrode 28 being formed on the inside of the second chamber and the second electrode 24 being formed outside of the second chamber. See fig. 2 and the cited passages above. With respect to the sensor being an oxygen sensor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

10. With respect to claims 34 and 35, see the discussion for claim 32 above. In addition, the sensing of humidity and NOx is also the intended use of the device. However, Kato '811 teaches the use of this sensor configuration for both NOx sensing (col. 13, l. 65 through 14, l. 5) and humidity sensing (col. 24, ll. 32- 42).

11. Claims 16-20, 22, 24, 30 and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-38845 (hereafter "JP '845") in view of Kato '811 and Makino. For this rejection over JP '845, the examiner will rely on citations from the English language text of USP 6,036,841 for the support for this rejection.

12. Like Kato '811 above, JP '845 discloses a NOx sensor with negative and positive electrodes (11 and 14) and a circuit for applying an electric potential between the negative and positive electrodes where the electrodes are shown in profile as differing in area, including by at

least 2:1. See fig. 1 and 2 and col. 6, ll. 32-41. However, because JP '845 does not show how far each of these electrodes extends into their respective gas chambers (i.e. their widths in the vertical direction of fig. 1), an explicit determination that the electrodes of JP '845 differ in size cannot be made. However, having the electrodes of a gas sensor extend over the entire width range of a given chamber was known in the art. In particular, Makino demonstrates this. See, as an example, fig. 2 where pump electrode 8 and reference electrode 13 are shown to extend over the entire width of their respective chambers. There are a number of reasons one possessing ordinary skill in the art would have been motivated to do so. One, making the electrodes extends provides the maximum surface area for the electrode, thereby reducing any effective resistance, increasing the magnitude of the diffusion control. In addition, large electrodes (i.e. electrodes that extend the entire width of their chamber) also allow more sample to be analyzed per unit time. In addition, electrodes that span the entire chamber width would prevent any localization of NOx concentration. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Makino for the sensor of JP '845 in order to utilize any of the set forth advantages given above.

13. JP '845 also did not particularly set forth the use of porous platinum for both of these electrodes. However, the previously relied on Kato '811 (commonly owned with overlapping inventorship to JP '845) established that both the measuring 28 and reference 24 electrodes of its NOx sensor (equivalent to electrodes 14 and 11 respectively of JP '845). See Kato '811, col. 12, ll. 14-16 and col. 18, l. 66 through col. 22. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Kato '811 for the

electrodes of JP '845 because the use of already effective electrode compositions for a similarly constructed NOx requires only routine skill in the art.

14. With respect to claim 17 (those limitations not covered above), the set forth element resistances would have been inherent because the sizes shown by the combined teachings of JP '845, Kato '811 and Makino.

15. With respect to claims 18-20 (those limitations not covered above), the particular voltages applied or their polarities is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, Kato '811 already established the necessary voltages for constructing both a NOx and humidity sensor. See col. 13, l. 65 through 14, l. 5 or col. 24, ll. 41 and 42.

16. With respect to claim 22, see JP '845, col. 5, ll. 27-30.

17. With respect to claim 24, a flat-limit current sensor is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, the sensor of JP '845 is flat and is presumably for the monitoring of a limiting current. See Kato '811, which makes that explicit.

18. With respect to claim 30 (those limitations not covered above), any of elements 1, 8 or 57 would read on the defined gas diffusion limiting means. In addition, current between electrodes 14 and 11 is a measure of the amount of NOx in the atmosphere. See col. 5, ll. 41-53.

19. With respect to claim 32 (those limitations not covered above), JP '845 comprises first and second chambers (2 and 9 respectively) formed between first and second ion conductive cell substrates (3 and 19 respectively) where first and second electrodes (14 and 11 respectively) are on the same plane as substrate 19 with electrode 14 being formed on the inside of the second

chamber and the second electrode 11 being formed outside of the second chamber. See fig. 1 and 2 and the cited passages above. With respect to the sensor being a oxygen sensor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

20. With respect to claims 34 and 35, see the discussion for claim 32 above. In addition, the sensing of humidity and NOx is also the intended use of the device. However, JP '845 teaches the use of this sensor configuration for NOx sensing (see above) while Kato '811 renders obvious the measurement of humidity utilizing a similar electrode configuration (see rejection above). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize this further teaching of Kato '811 for JP '845 so as to further extend the utility of the sensor to other relevant constituents in exhaust gas.

Allowable Subject Matter

21. Claims 36 and 37 are allowed.

Response to Arguments

22. Applicant's arguments filed 9-15-2006 have been fully considered but they are not persuasive.

23. Applicant continues to urge that the examiner is not entitled to infer anything about the electrode lengths in Kato '811 because the drawings of Kato '811 are not to scale. The examiner addressed this issue in paragraph 30 of the previous office action. In particular, the examiner maintains that the issue of scale decided by the prior case law concerned issues of literal scale of

the drawings and not the issue of proportional scale here. Moreover, the examiner would maintain that the secondary teaching reinforces the proportional scale of Kato '811 when Makino also shows its reference electrode 13 as being considerably smaller than either of the pumping electrodes (7, 8). See fig. 2 and 5 as examples. This is analogous to the proportionality of Kato '811 reference electrode 24 to pumping electrodes 28, 16, and 18 shown in its figures. The reasons for making electrode 28 at least twice as long as electrode 24 as shown by the figures would have been apparent to one possessing ordinary skill in the art. In particular, electrode 28 must be sufficiently large to efficiently consume all the NOx that enters chamber 8. See col. 12, ll. 34-42. By contrast, reference electrode 24 need only be large enough to (a) provide a reference potential for electrode 22, and (b) provide a surface to release the oxygen being delivered to it by electrode 28. See col. 12, ll. 20-28 and 42-47. With respect to function (a), Makino teaches that EMF electrodes need not be very large in comparison to pumping electrodes. With respect to function (b), the amount of oxygen that electrode 24 would have to release would be at ppm levels because there are only ppm levels of NO in the exhaust gas (fig. 5) and only one O_2 molecule is released for every 2 NO molecules in the gas space 8 (col. 14, ll. 8-17). Hence, even if the examiner were persuaded that one cannot rely on the drawings for any understanding of relative proportions of these two electrodes, one possessing ordinary skill in the art would have been motivated to utilize the various length proportions shown in the figures of Kato '811 because one would recognize that the size of electrode 28 is more critical to the sensor operation than the size of electrode 24.

24. With respect to Makino, applicant urges that there is nothing in the cited prior art as to why it would be desirable to employ such an electrode arrangement. However, motivation need

not come solely from the references themselves, but can come from knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the examiner gave a number of reasons why one possessing ordinary skill in the art would have been motivated to have the pump electrode 28 of Kato '811 extend the entire length of the measurement chamber like shown by Makino. See paragraphs 9 and 18 from the previous office action. Applicant does not appear to have identified why the examiner was in error for any of these reasons.

Conclusion

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
November 22, 2006

KAJ K. OLSEN
PRIMARY EXAMINER